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Research Article

Two new species of *Scolia* (Hymenoptera, Scoliidae) from Mexico and Panama

Luis Damián Ramírez-Guillén[1], Jorge L. León-Cortés[2], Armando Falcon-Brindis[3]

1 *Posgrado en Ciencias en Ecología y Desarrollo Sustentable, El Colegio de la Frontera Sur, Carretera Panamericana y Periférico Sur s/n C.P. 29290, San Cristóbal de las Casas, Chiapas, Mexico*
2 *Departamento de Conservación de la Biodiversidad, El Colegio de la Frontera Sur, Carretera Panamericana y Periférico Sur s/n C.P. 29290, San Cristóbal de las Casas, Chiapas, Mexico*
3 *Department of Entomology, Plant Pathology, and Nematology, University of Idaho, Parma Research and Extension Center, 29603 U of I Lane, Parma, Idaho 83660, USA*

Corresponding authors: Luis Damián Ramírez-Guillén (luis.ramirez@estudianteposgrado.ecosur.mx); Jorge L. León-Cortés (jleon@ecosur.mx); Armando Falcon-Brindis (armandofalcon123@gmail.com)

Abstract

Two new species of *Scolia* (Scoliinae, Scoliini) are described from Mexico and Panama: *Scolia bartletti* **sp. nov.** and *Scolia albumtenebris* **sp. nov.**, respectively. Morphological diagnostic characters are provided to distinguish the new species from other *Scolia* species, together with a taxonomic key to *Scolia* from North and Central America. This study adds two species to the known *Scolia* fauna in America, increasing the total to 14 species.

Key words: Mammoth wasps, Scoliinae, Scoliini, taxonomy

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Introduction

After the first publication dedicated to the North American Scoliidae (Bartlett 1912), comprehensive works focused on these wasps have been scarce, especially in the Americas. Efforts to understand the tribe Scoliini have emerged in the last 5 years, with emphasis on the North American and Central American species (Añino et al. 2020, 2024; Ramírez-Guillén et al. 2022, 2025; Golfetti et al. 2025).

The genus *Scolia* Fabricius, 1775, is a cosmopolitan group with 12 valid species in the New World: *S. bicincta* Fabricius, 1775; *S. nobilitata* Fabricius, 1804; *S. rufiventris* Fabricius, 1804; *S. dubia* Say, 1837; *S. guttata* Burmeister, 1854; *S. jucunda* Saussure, 1858; *S. mexicana* Saussure, 1858; *S. vintschgaui* Dalla Torre, 1893; *S. binominata* Schulz, 1906; *S. scutata* Bréthes, 1911; *S. cubensis* Bartlett, 1912; and *S. fuscipennis* Bartlett, 1912 (Osten 2005). It was originally divided into three subgenera: *Scolia*, *Discolia* Saussure, 1863, and *Hesperoscolia* Bradley, 1974 (Osten 2005). However, the latter is now a junior synonym of the subgenus *Discolia*. In this regard, the subgenera *Scolia* and *Discolia* include species occurring in the Old World and New World, respectively (Golfetti et al. 2025).

After an exhaustive review of the Mexican Scoliidae, we observed that some male specimens of *Scolia guttata* Burmeister, 1854, showed a clear difference in size. Additionally, we noticed consistent differences in the male genitalia

compared to the large *S. guttata*. Furthermore, we observed that the male genitalia shown in Añino et al. (2020) were closer to *S. mexicana* Saussure, 1858, than to *S. guttata*. Such discrepancies led to further revision of the specimens, which were potentially undescribed species.

Here, we describe two new species of *Scolia* from Mexico and Panama and generate a taxonomic key for *Scolia* from North and Central America. We provide clarification on some specimens excluded from previous works (Añino et al. 2020; Ramírez-Guillén et al. 2022), which do not strictly fit into *S. guttata*.

Materials and methods

The specimens were obtained from El Colegio de la Frontera Sur, Unidad San Cristóbal, Colección Entomológica (ECO-SC-E), Universidad de Guanajuato (ICA-GTO), Universidad Michoacana de San Nicolás de Hidalgo (CEUM), Universidad Nacional Autónoma de México, Instituto de Biología (CNIN), and Museo de Invertebrados G. B. Fairchild de la Universidad de Panamá (MIUP). The Mexican collections were visited in 2022, and the collection of Panama in October 2023. The examination of specimens was conducted in the Entomology Laboratory of El Colegio de la Frontera Sur (ECOSUR), Unidad San Cristóbal, Chiapas, Mexico.

We followed Huber and Sharkey (1993) and Taylor and Barthélémy (2021) for morphological terminology. The metasomal terga and sterna are abbreviated as T and S, respectively. To extract the male genitalia, specimens were softened in humid chambers for 4 days, then carefully extracted and placed within individual opaline triangles with their respective specimen. Pictures were obtained using a Leica MC170HD camera integrated into a Leica M250C stereoscope. Images were aligned in Leica Application Suite 4.9. Both cleaning and correction processes were performed in Adobe Photoshop version 22.4.3. ArcGIS 10.3 was used to construct the distribution maps. The type specimens are deposited at El Colegio de la Frontera Sur, Unidad San Cristóbal, Colección Entomológica (ECO-SC-E).

Results

Taxonomy

Family: Scoliidae Latreille, 1802
Subfamily: Scoliinae Latreille, 1802
Tribe: Scoliini Latreille, 1802
Genus: *Scolia* Fabricius, 1775

***Scolia bartletti* Ramírez-Guillén, sp. nov.**
https://zoobank.org/57F44F62-CAAE-4FC2-8D43-16E24CBB8A20
Figs 1A, B, 2A, 7A, B

Type material. ***Holotype:*** MEXICO • ♂; Chiapas, Mpio: Cintalapa, Cintalapa; 16.524°N, 94.164°W (DD) 1352 m. a.s.l.; 02.ix.2014; Jorge Merida leg. ***Paratypes:*** MEXICO • 1 ♂; Guanajuato, Irapuato, Cerro De Villas; 3.x.2011; Guillermo Borja leg. • 1 ♂; Michoacán, Mpio: Zinapécuaro, Loc: San Nicolas Simirao; 08.iii.1991. • 1 ♂; Oaxaca, Dominguillo, Km 65 Car. 135; 900 m a.s.l.; 19 Nov. 1976; E. Barrera leg. • 1 ♂; Guerrero, San Jerónimo; 18.iv.1988; A. Cadena, M. García, L. Cervantes leg.

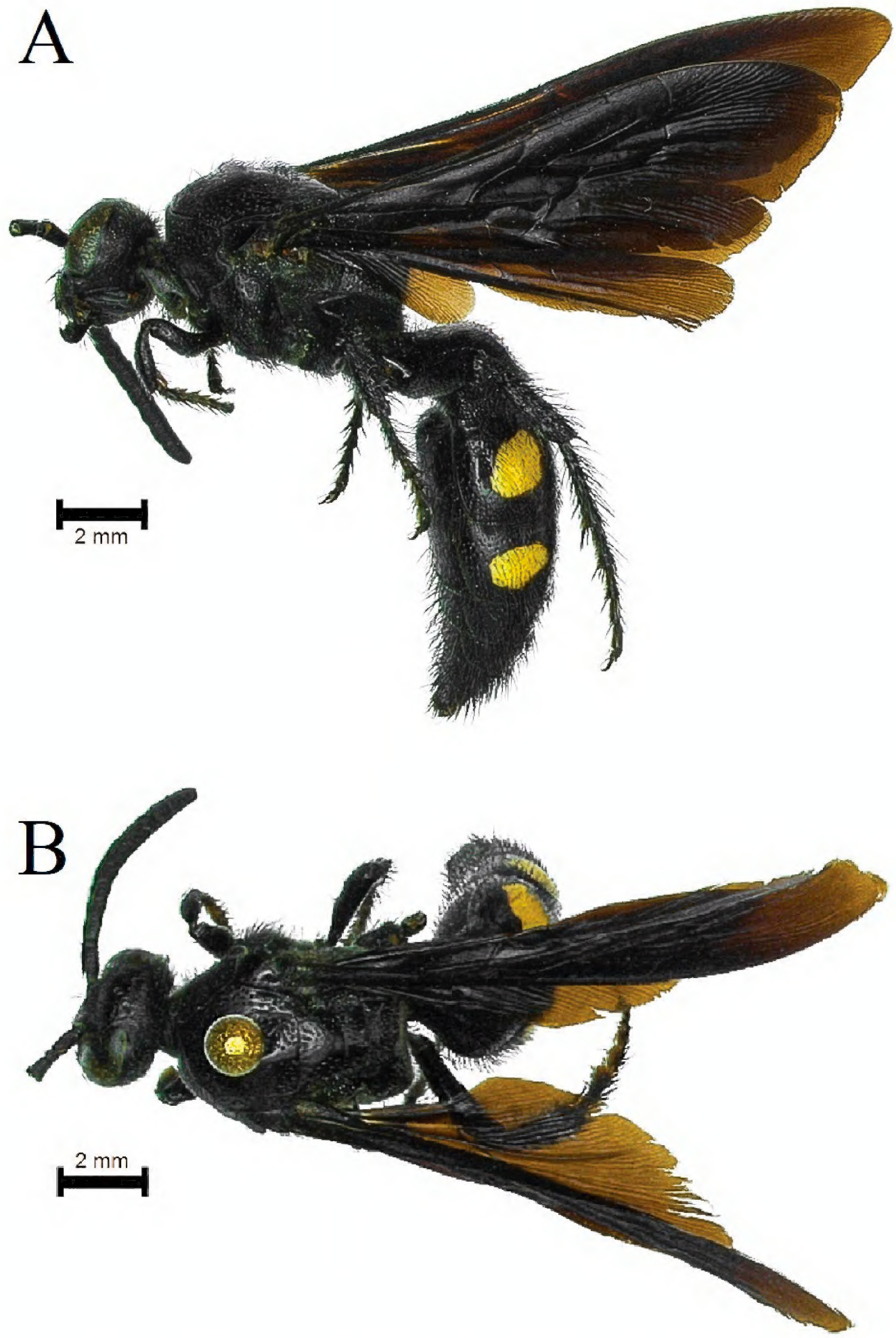

Figure 1. *Scolia bartletti* sp. nov. male, holotype. **A.** Lateral view; **B.** Dorsal view.

Diagnosis. *Scolia bartletti* sp. nov. can be distinguished from other species of *Scolia* by elongated paramere with a slight inward tilt from the middle and tapering towards the cuspis volsellaris; lamina volsellaris with long setae (Fig. 7A, B).

Male description. ***Length*** 13–16 mm.

Head. Clypeus concave apically with sparse punctures; centre of clypeus less punctate. Frons with sparse punctures, denser in the inter-antennal area. Ocular sinus punctate. Vertex with sparse punctures. Edges of clypeus, ocular sinus and vertex with sparse, short setae.

Mesosoma. Pronotum with dense punctures. Mesoscutum, scutellum and metanotum with sparse punctures. Dorsal area of propodeum with dense punctures, posterior face with dense marginal punctures and scattered punc-

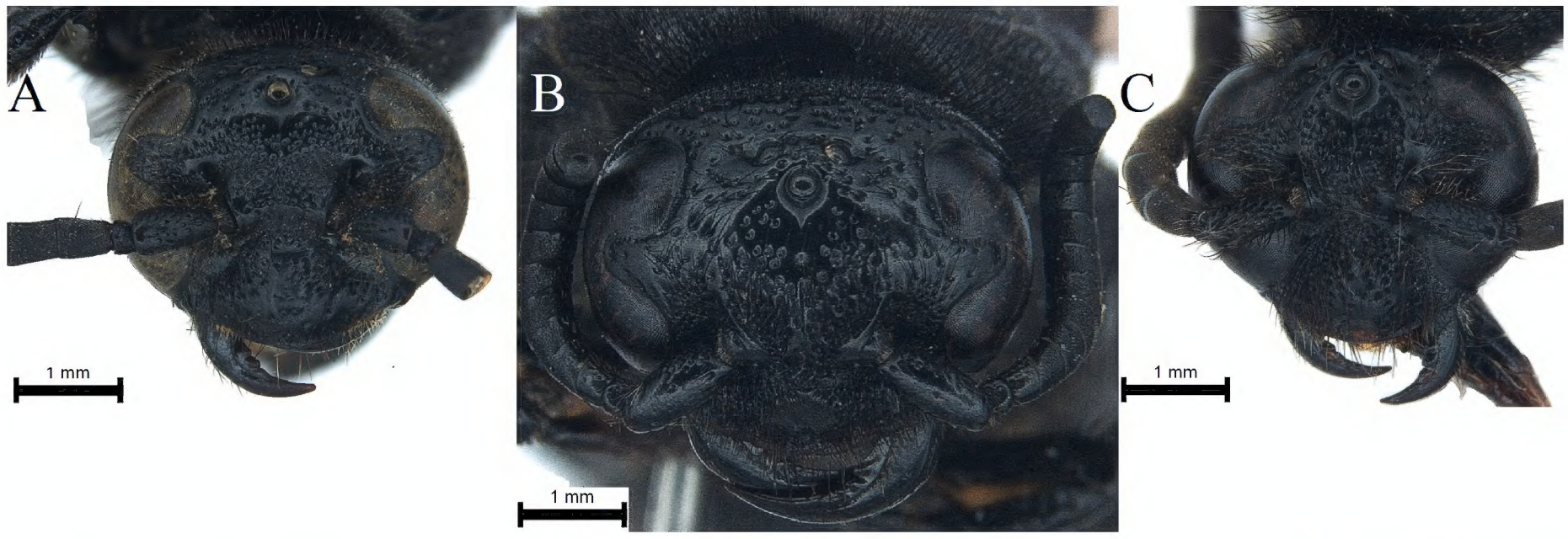

Figure 2. A. *Scolia bartletti* sp. nov. male, holotype, head, frontal view. **B.** *Scolia albumtenebris* sp. nov. female holotype, head, frontal view. **C.** *Scolia albumtenebris* sp. nov. male paratype, head, frontal view.

tures on the central plate, lateral area of propodeum with scattered punctures. Metasternal plate without tubercle. Mesopleuron with scattered punctures; upper plate of metapleuron with scattered punctures, lower plate with fewer scattered punctures. Pronotum and mesoscutum with long dense setae; rest of mesosoma with sparse short setae.

Metasoma. Terga with fine irregular punctures. S2 with two anteromedial tubercles. Sterna with fine and irregular punctures. T1–T3 with short sparse setae, mostly abundant in the remaining tergites, long setae apically on tergites. S1–S3 with sparse long setae, mostly abundant in the remaining sternites.

Genitalia. Paramere elongated, narrowing towards cuspis volsellaris; in ventral view, bearing a ventral row of setae, extending from inferior edge to outer edge; in dorsal view, central area of paramere with sparse and coarse setae, edges of the paramere with thin setae. Ventral view lamina volsellaris with sparse, long setae, exterior edge with a dense group of sensory cones. Ventral view of cuspis volsellaris with sparse, long setae; exterior edge with sensory cones apically.

Colouration. Integument black. T2–T3 with a yellow spot on each side. Body with black setae. Wings dark brown with violaceous reflections, costal margin of fore-wing darker.

Variations. The yellow spots on T2 are lacking in one specimen (Oaxaca, Dominguillo, km 65 Car. 135; 900 m a.s.l.), and another specimen has yellow spots on T1–T3; those on T3 are smaller (Guanajuato, Irapuato, Cerro De Villas; 3.x.2011; Guillermo Borja leg.).

Etymology. The name is dedicated to the entomologist Oscar C. Bartlett for his contribution to the knowledge of Scoliini in America.

Distribution. Mexico (Chiapas, Guanajuato, Guerrero, Michoacán, Oaxaca) (Fig. 8).

Female. Unknown.

Scolia albumtenebris **Ramírez-Guillén, sp. nov.**
https://zoobank.org/6850E2E6-92AB-4C7B-8FA9-EB51E0246EDB
Figs 2B, C, 3A, B, 4A, B, 5A, B, 6A, B; 7E, F

Type material. ***Holotype:*** PANAMA • ♀; Panamá Oeste, Isla Barro Colorado; 21–28. vi. 2006; D. Windsor leg.; MT 313. ***Paratypes:*** PANAMA • 1 ♂; same data as holotype.

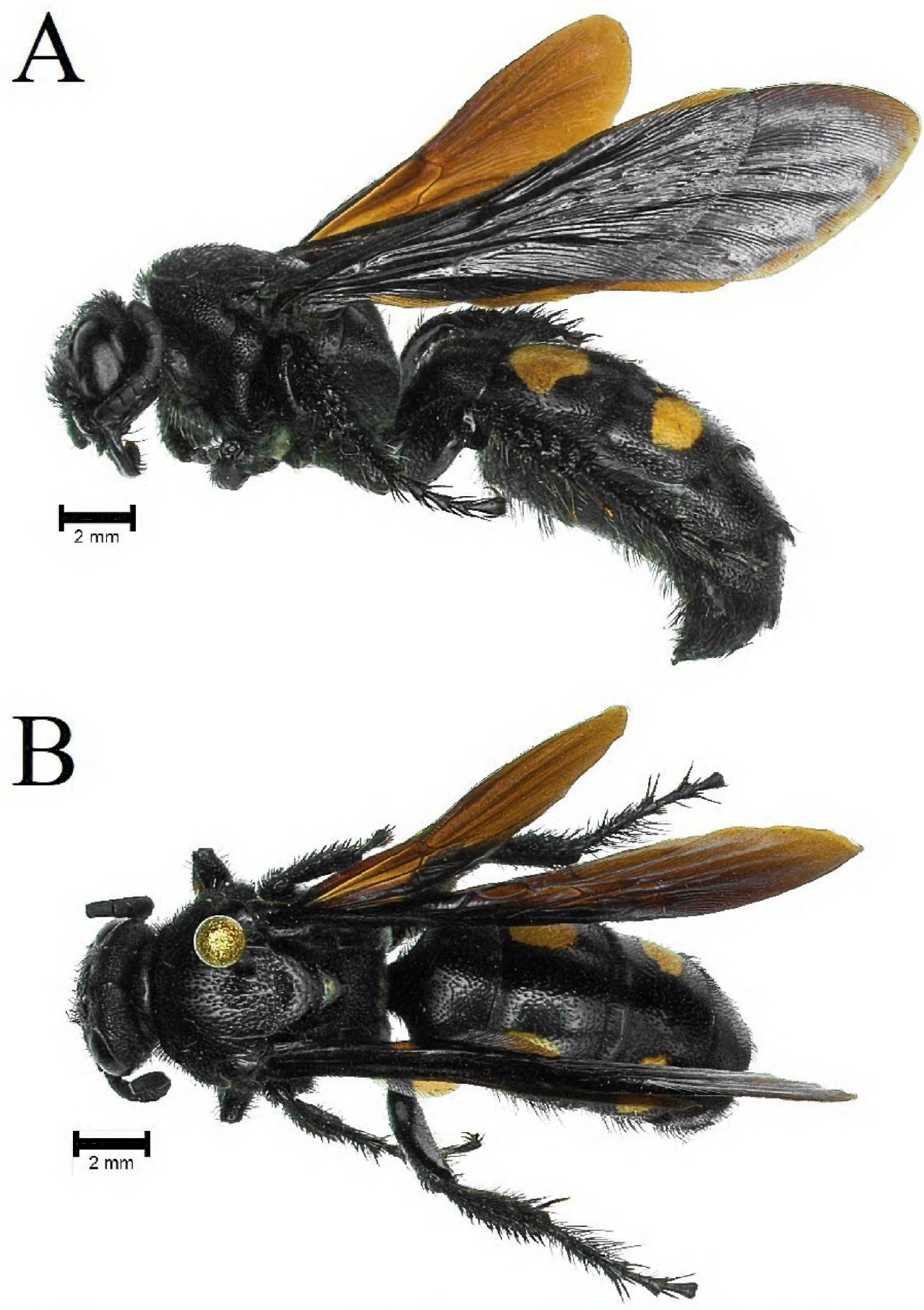

Figure 3. *Scolia albumtenebris* sp. nov. female, holotype. **A.** Lateral view; **B.** Dorsal view.

• 1 ♂; Panamá Oeste, Isla Barro Colorado; 25.v.2001 to 05.vi.2001; D. Windsor leg.; MT 318. • 1 ♂; same collection data as for preceding; 22–29.vi.2005; same collection data as for preceding; MT 313. • 1♀; same collection data as for preceding; 08–15.vi.2005; same collection data as for preceding; MT 315. • 1 ♀; Panamá, Soberanía, Camino Plantación; 3.viii.2001; D. Quintero, R. Cambra, A. Santos, L. De Gracia leg. • 1 ♂; Darién, Chucantí reserve; 18–21.vi.2022; Buffington, Chamorro, Medeiros leg.

Diagnosis. *Scolia albumtenebris* sp. nov. can be distinguished from other *Scolia* species by the following combination of characters. Females: posterior face of propodeum with scattered punctures (Fig. 5A); body with black setae, metasoma and mesosoma with a mix of black and whitish-yellowish setae (Fig. 6A).

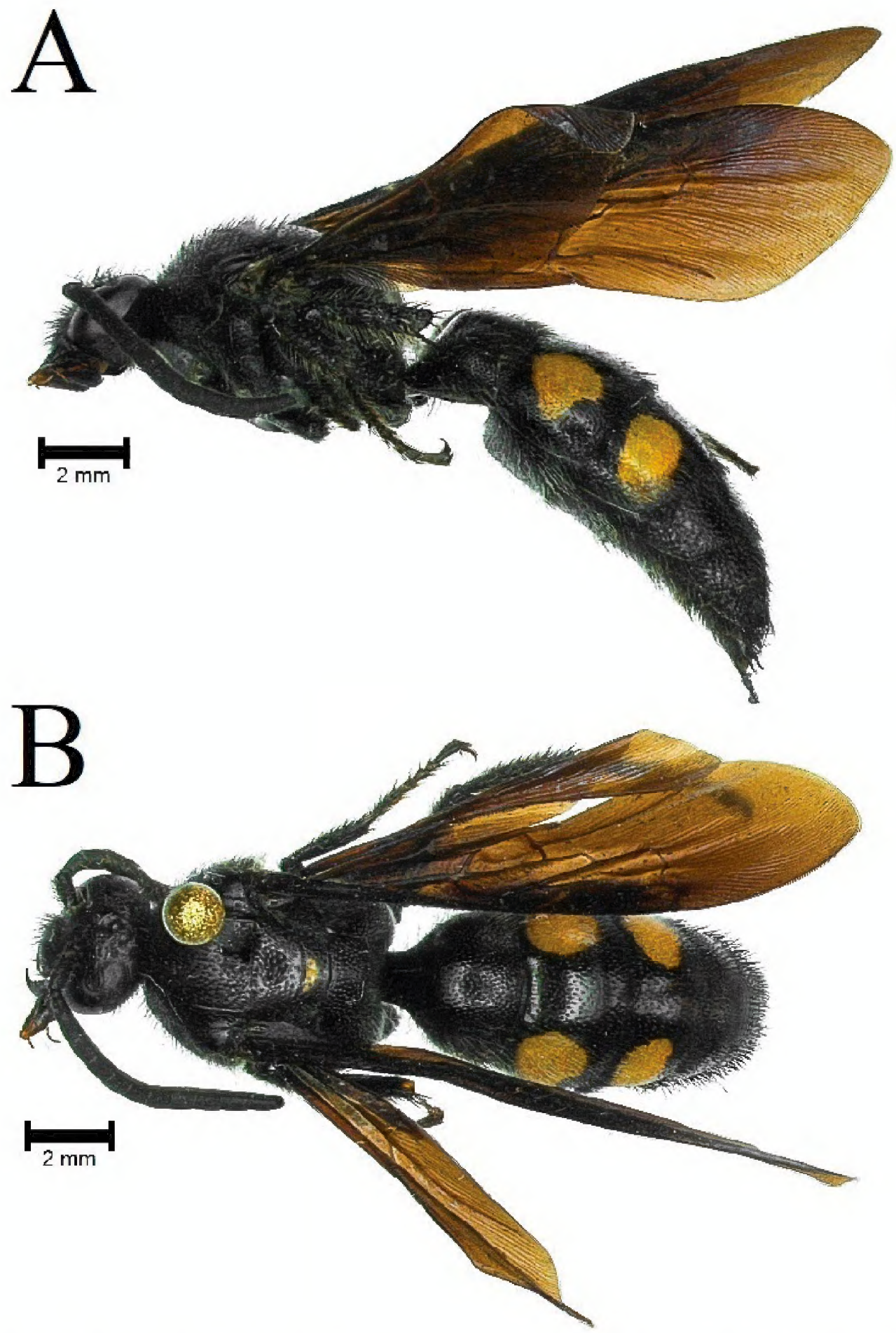

Figure 4. *Scolia albumtenebris* sp. nov. male, paratype. **A.** Lateral view; **B.** Dorsal view.

Males: posterior face with dense punctures on the sides and scattered punctures in middle (Fig. 5B); head and tergites with black setae (except on the yellow spots), the remaining portion of the body with whitish-yellowish setae (Fig. 6B); paramere forming 90-degree angle inwards (Fig. 7E, F).

Female description. ***Length*** 16–17 mm (Figs 2B, 3A, B, 5A, 6A).

Head. Clypeus rounded apically, punctate, discal region impunctate and smooth, subapically and lateral edges with dense and coarse punctures. Frons with sparse punctures, denser between the inter-antennal areas. Ocular sinus almost impunctate. Vertex with dense punctures. Edges of clypeus, frons and vertex with short sparse setae. Anterior ocellus with cleft and median fissure.

Mesosoma. Pronotum with fine, dense punctures. Mesoscutum, scutellum and metanotum with sparse punctures. Dorsal area and posterior face of propodeum with sparse punctures. Metasternal plate with tubercle. Mesopleuron with

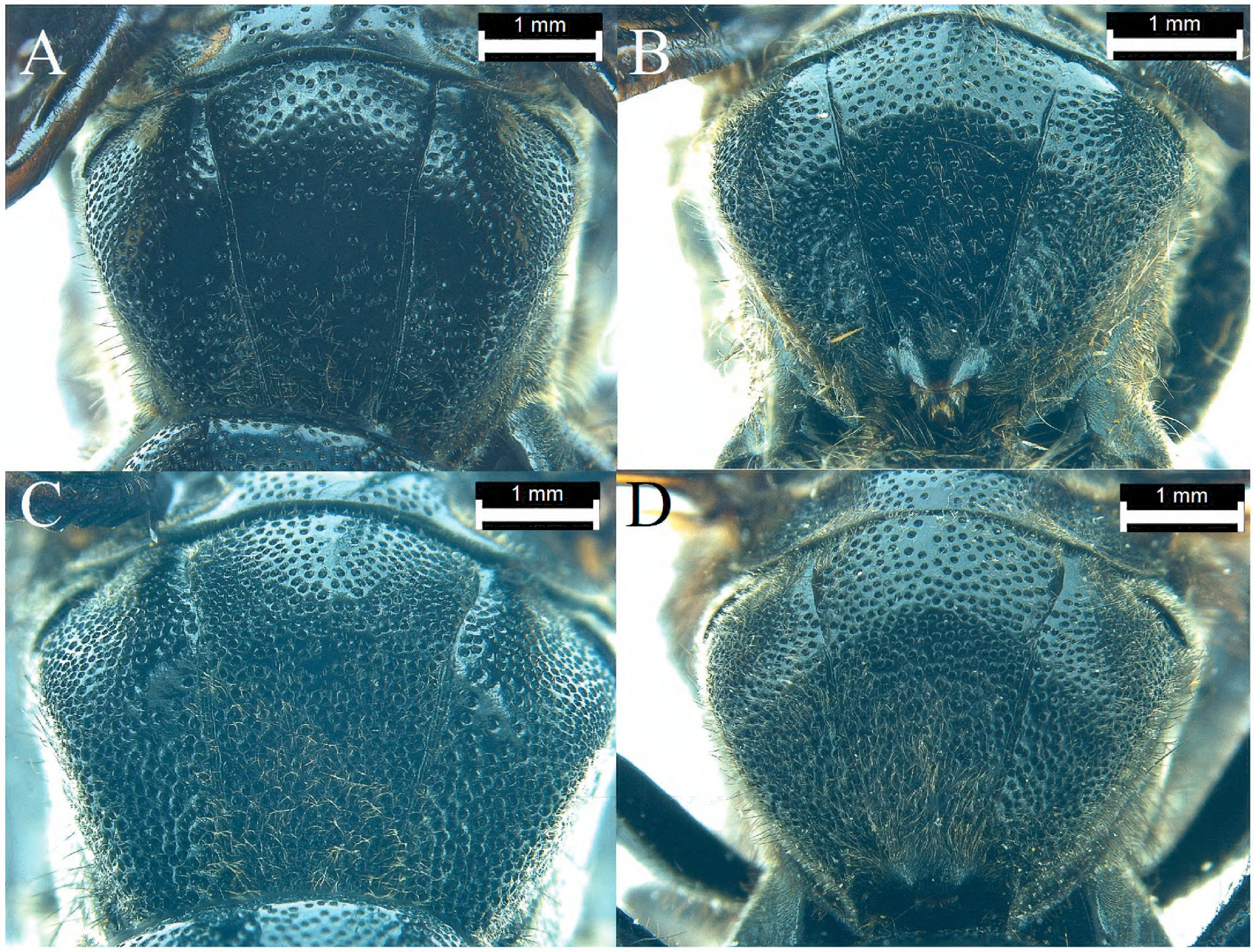

Figure 5. Posterior face of propodeum: **A, B.** *Scolia albumtenebris* sp. nov.: **A.** Female, holotype; **B.** Male, paratype. **C, D.** *Scolia mexicana*: **C.** Female; **D.** Male.

scattered punctures. Metapleuron with scattered punctures on both upper and lower plates. Pronotum, mesoscutum with long dense setae; rest of mesosoma with sparse short setae.

Metasoma. Terga with fine irregular punctures. S2 with a single median tubercle. Sterna with fine and irregular punctures. T1–T3 with short sparse setae, mostly abundant in the remaining tergites, long setae apically on tergites. Sterna with long dense setae.

Colouration. Integument black. T2–T3 with a yellow spot on each side. Metanotum with a small yellow spot. Body with black setae, metasoma and mesosoma with a mix of black and whitish-yellowish setae. Wings dark brown with violaceous reflections.

Variations. Without yellow spot on metanotum in one specimen (Panamá, Soberanía, Camino Plantación; 3.viii.2001; D. Quintero, R. Cambra, A. Santos, L. De Gracia leg.).

Male description. ***Length*** 16–19 mm (Figs 2C, 4A, B, 5B, 6B, 7E, F).

Head. Entirely covered with setae. Clypeus concave apically, punctate, discal region barely punctate. Frons with dense punctures, some denser between the inter-antennal area. Ocular sinus with fine, dense punctures. Vertex with sparse punctures. Margin of anterior ocellus with a median fissure. Edges of clypeus with long, sparse setae, frons, ocular sinus and vertex with short, sparse setae.

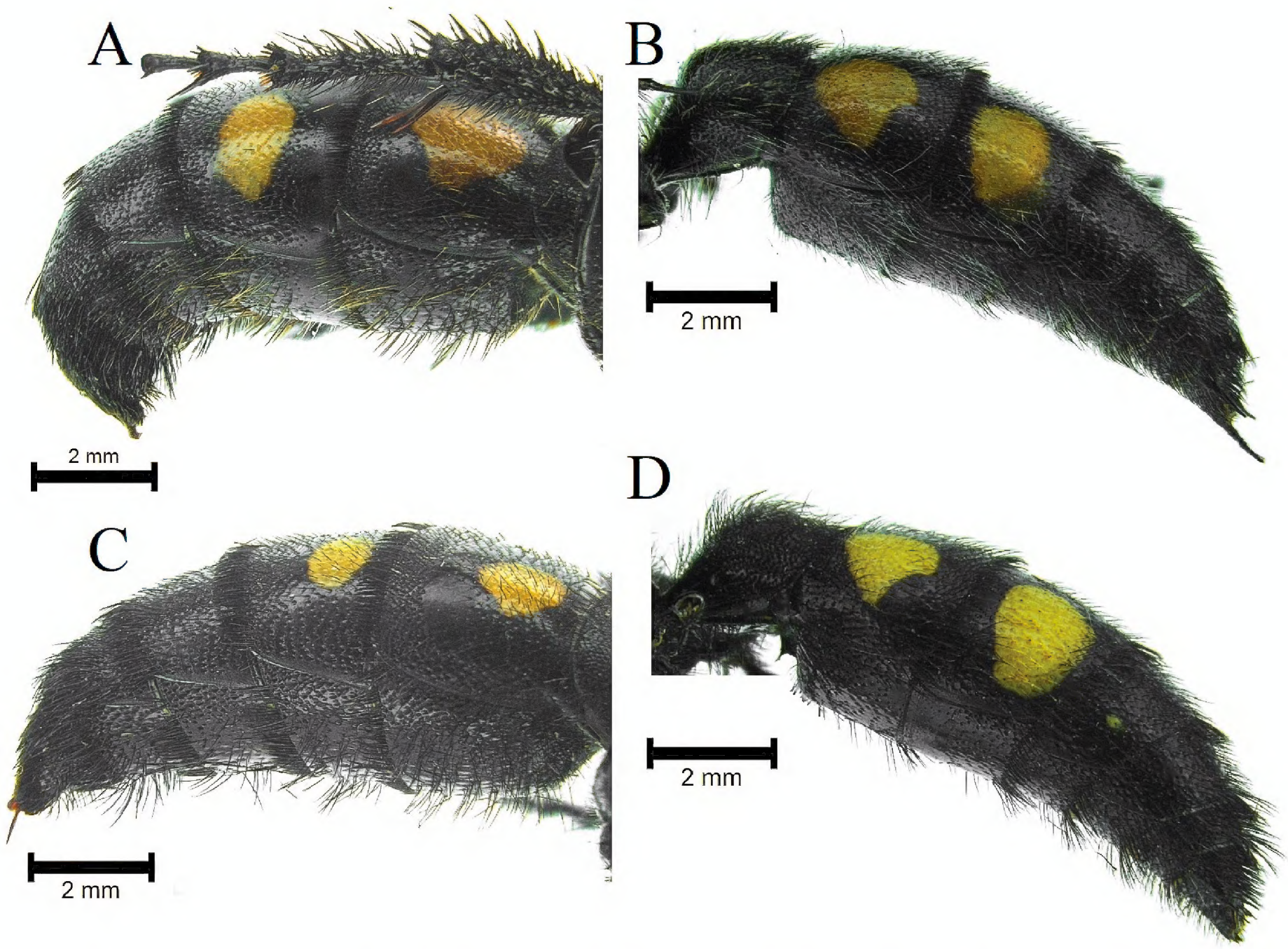

Figure 6. Lateral view of metasoma: **A, B.** *Scolia albumtenebris* sp. nov.: **A.** Female, holotype; **B.** Male, paratype. **C, D.** *Scolia mexicana*: **C.** Female; **D.** Male.

Mesosoma. Pronotum with dense punctures. Mesoscutum, scutellum and metanotum with sparse punctures. Dorsal area of propodeum with sparse punctures, posterior face with dense punctures on the margins and scattered punctures in the middle zone. Metasternal plate with tubercle. Mesopleuron with scattered punctures. Upper plate of metapleuron with sparse punctures, lower plate of metapleuron smooth. Scutellum, metanotum and propodeum with sparse short setae; rest of mesosoma with long dense setae.

Metasoma. Terga with fine irregular punctures. S2 with a single median tubercle. S1–S7 with fine and irregular punctures. T1–T3 with short sparse setae, mostly abundant in the remaining tergites, long setae apically on tergites. S1–S3 with long dense setae, mostly abundant and long in the remaining sternites.

Genitalia. Paramere strongly truncated, almost forming a right-angle inwards; in ventral view, bearing a row of setae, starting at inferior edge and extending along lateral edges with sparse long coarse setae; discal and apical region without setae; in dorsal view, with sparse coarse setae. Ventral view lamina volsellaris with sparse and long setae, longer apically, external edge with a dense group of sensory cones. Ventral view of cuspis volsellaris bearing sparse and long setae and with sensory cones apically on external edge.

Colouration. Integument black. T2–T3 with a yellow spot on each side. Head, pronotum, mesoscutum, scutellum and tergites bearing black setae (except on the yellow markings on T2–T3 and metanotum, which are whitish-yellow), the

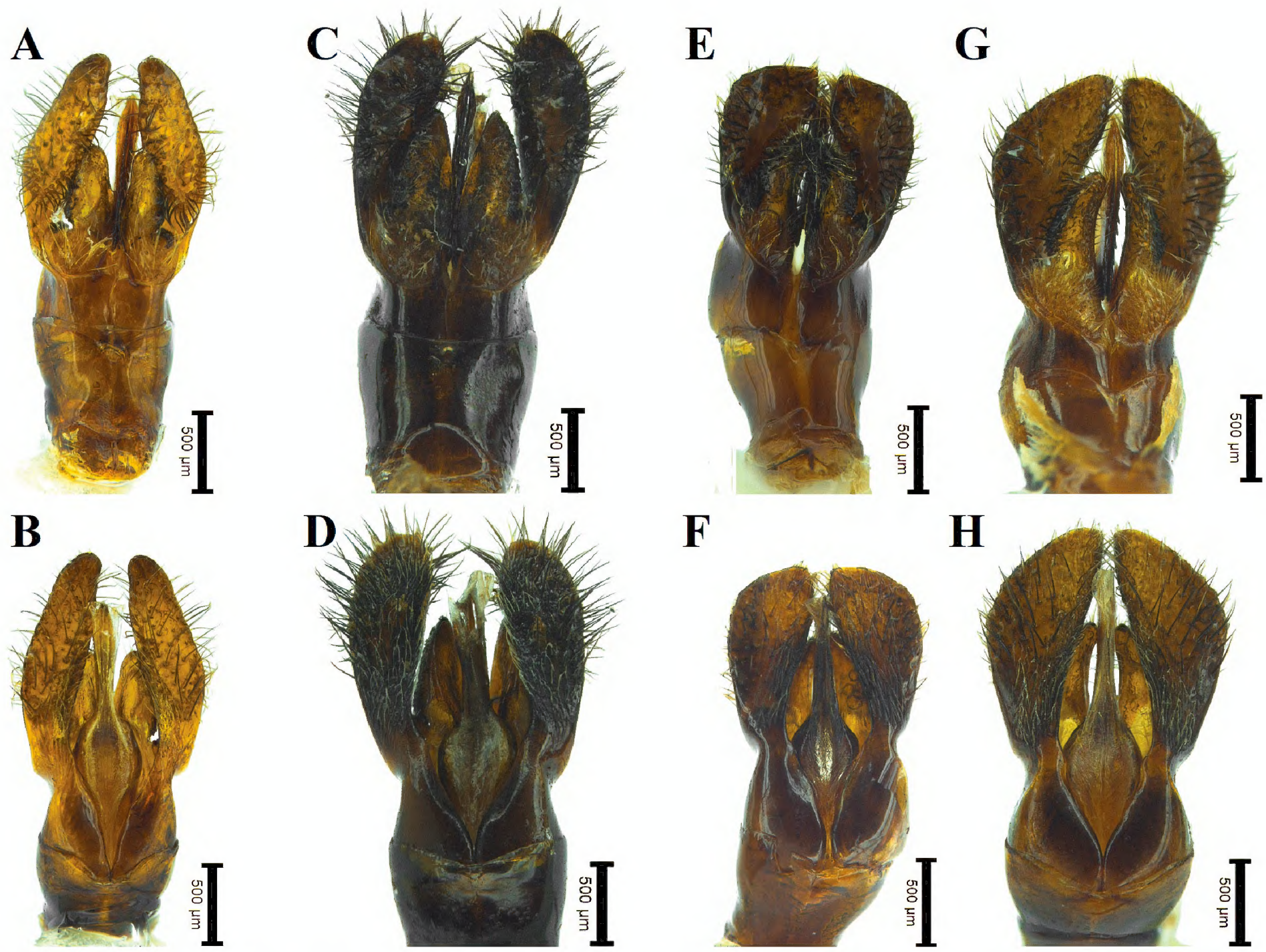

Figure 7. *Scolia bartletti* sp. nov. male, holotype genitalia: **A.** Ventral view; **B.** Dorsal view. *Scolia guttata* male, genitalia: **C.** Ventral view; **D.** Dorsal view. *Scolia albumtenebris* sp. nov. male, paratype genitalia: **E.** Ventral view; **F.** Dorsal view. *Scolia mexicana* male, genitalia: **G.** Ventral view; **H.** Dorsal view.

remaining portion of the body with whitish-yellow setae. Wings dark brown with violaceous reflections; costal margin of fore-wing darker.

Etymology. The name refers to the distinctive white and dark mixed setae. From "*album*" (Latin for "white") and "*tenebris*" (Latin for "dark").

Distribution. Panama (Darién, Panamá, Panamá Oeste) (Fig. 9).

Key males and females of *Scolia* from North and Central America

1 Without tubercle on metasternal plate.....**2**
– With a median tubercle on metasternal plate **6**
2(1) Body black with yellow spots on terga or immaculate **3**
– Body not entirely black, either with ferruginous sections on terga bearing yellow spots or immaculate.....**5**
3(2) S2 with yellow spots (female unknown) ..... ***S. fuscipennis* Bartlett**
– Sterna without yellow spots **4**
4(3) With yellow spots on T2–T3, T2–T4, T1–T4, T1–T5 or immaculate (*S. guttata* var. *eximia* Smith, 1855); body length 26.9 mm in females (19.2 mm–36.3 mm) 21.1 mm in males (range 14.5 mm–26.6 mm); paramere not elongated (Fig. 7C, D) without a slight inward tilt from the middle and not

narrowing towards cuspis volsellaris; lamina volsellaris with short setae . ..... ***S. guttata guttata* Burmeister**

– With yellow spots on T2–T3, T2–T4 or T3; body length 14.6 mm (13 mm–16 mm); paramere elongated (Fig. 7A, B) with a slight inward tilt from the middle and narrowing towards cuspis volsellaris; lamina volsellaris with long setae (female unknown) ..... ***S. bartletti* sp. nov.**

5(2) Body predominantly black, except for the third abdominal segment, which is ferruginous; terga immaculate (*S. dubia haematodes* Burmeister) or T3 with yellow spots ..... ***S. dubia dubia* Say**

– Body predominantly ferruginous, yellow spots on T1–T5, T2–T5 (*S. nobilitata otomita* Saussure), T3–T5 (*S. nobilitata otomita* var. *consors* Saussure), T2–T4 (*S. nobilitata tricincta* Say) or T2–T3 .... ***S. nobilitata nobilitata* Fabricius**

6(1) Body predominantly ferruginous without yellow spots on tergites..... ..... ***S. rufiventris* Fabricius**

– Body black with or without yellow spots on terga..... **7**

7(6) Body predominantly with whitish setae; yellow bands in T3–T5, rarely in T2–T5..... ***S. vintschgaui* Dalla Torre**

– Body completely or predominantly with black setae **8**

8(7) Yellow bands on T2–T3, T1–T3, T1–T4; sometimes bands may be interrupted medially, however, without forming two spots laterally on T2 and T3..... ***S. bicincta* Fabricius**

– T2–T3 with two yellow spots laterally (Figs 4B, 6C, D), rarely on T3 or completely immaculate **9**

9(8) Posterior face of propodeum densely punctate and bearing black setae (Fig. 5C, D); paramere not forming a 90-degree angle (Fig. 7G, H) .... ***S. mexicana* Saussure**

– Posterior face of propodeum sparsely punctate (Fig. 5A, B); setae predominantly white in males, females with a mix of black and whitish-yellowish setae; paramere forming 90-degree angle inwards (Fig. 7E, F)..... ..... ***S. albumtenebris* sp. nov.**

Discussion

No species had been described for Scoliini in America after Bartlett (1912); thus, this work updates the status of *Scolia* after over 100 years and adds two new species, increasing the list of *Scolia* to 14 species in the Americas. With this contribution, the list of American Scoliidae increases to 71 species in 14 genera (Osten 2005; Golfetti and Noll 2023a, 2023b; Szafranski 2023; Taylor 2024).

The specimens used for the description of *Scolia albumtenebris* sp. nov. were previously mentioned in Añino et al. (2020). However, we did not have the opportunity to re-examine all the specimens mentioned in Añino's work; thus, it is necessary to review them to verify whether they correspond to *Scolia albumtenebris* sp. nov. and not *Scolia guttata*. Currently, *S. guttata* has been recorded in the United States, Mexico, Guatemala, Costa Rica, Panama, Colombia, Venezuela, and Trinidad and Tobago (Kirby 1889; Cameron 1893; Bartlett 1912; MacKay 1987; Ramírez-Guillén et al. 2022). However, it is necessary to verify the distribution of this species, as it could have been confused with *Scolia bartletti* **sp. nov.**, *Scolia albumtenebris* sp. nov., or *S. mexicana*. These four

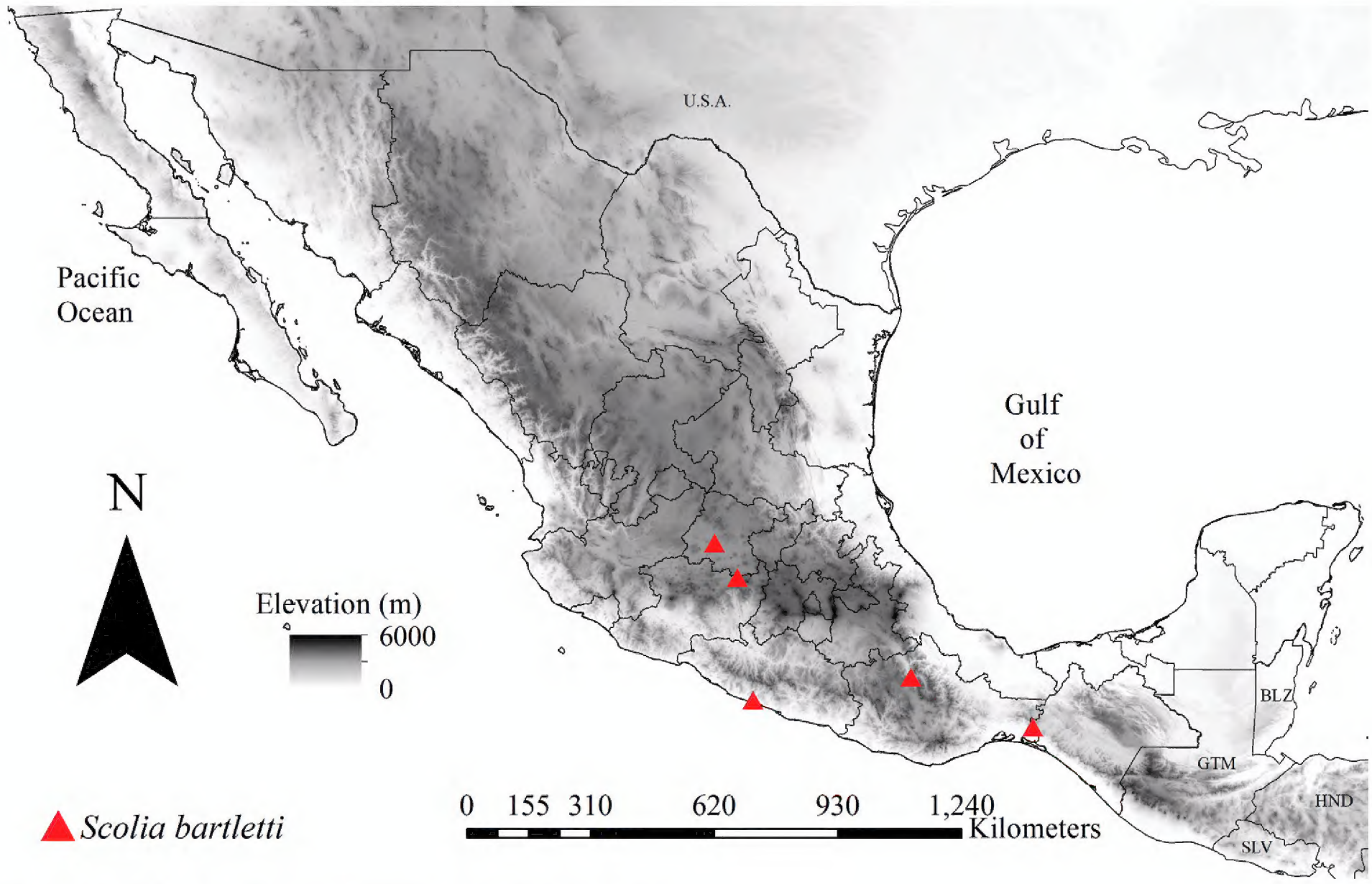

Figure 8. Distribution of *Scolia bartletti* sp. nov. in Mexico.

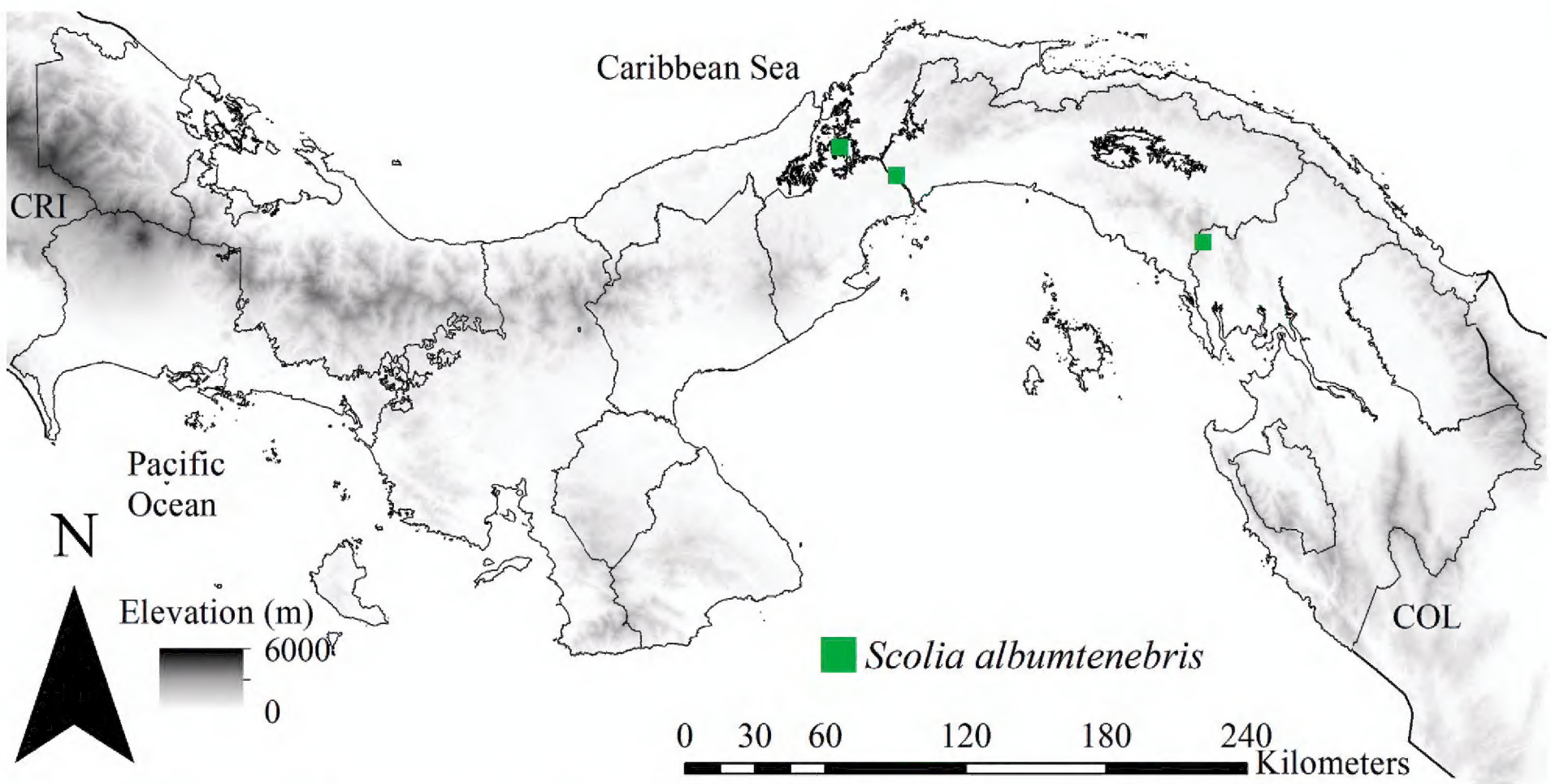

Figure 9. Distribution of *Scolia albumtenebris* sp. nov. in Panama.

species have a very similar colour pattern and can only be accurately separated by genitalia, punctures of the propodeum, median tubercle, and metasternal plate, which are often difficult to observe. Males of *Scolia bartletti* sp. nov. can only be separated by genitalia, which are characters mentioned in the taxonomic key. Currently, only the males of *S. fuscipennis* and *Scolia bartletti* sp. nov.

are known, and both species are endemic to Mexico. *Scolia albumtenebris* sp. nov. remains endemic to Panama, but it is necessary to review the Costa Rican specimens mentioned in Añino et al. (2020).

A complete revision of *Scolia* is necessary, especially since species such as *S. bicincta* might need to be split into two different species (Khouri et al. 2022; Golfetti et al. 2025). However, the differences to separate them remain unclear. Finally, it is important to validate the identity of the South American and Cuban *Scolia* species (i.e. *S. rufiventris* Fabricius, 1804, *S. jucunda* Saussure, 1858, *S. binominata* Schulz, 1906, *S. scutata* Bréthes, 1911, and *S. cubensis* Bartlett, 1912). Adding two new species expands our knowledge of the diversity of Scoliidae in America. The number of *Scolia* species is increased to 14, establishing the genus with the highest number, tied with *Pygodasis*. We mention the information gaps and species of *Scolia* that need to be addressed.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Use of AI

No use of AI was reported.

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Author contributions

Conceptualization: LDRG. Data curation: LDRG. Investigation: LDRG. Methodology: LDRG. Resources: AFB. Supervision: JLLC, AFB. Writing – original draft: LDRG. Writing – review and editing: JLLC, AFB.

Author ORCIDs

Luis Damián Ramírez-Guillén https://orcid.org/0000-0003-2853-2714
Jorge L. León-Cortés https://orcid.org/0000-0003-1706-5620
Armando Falcon-Brindis https://orcid.org/0000-0003-2496-2178

Data availability

All of the data that support the findings of this study are available in the main text.

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